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EXAMINER	
CHU, KIM KWOK	
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/465,592	Applicant(s) CULVER ET AL.
	Examiner Kim-Kwok CHU	Art Unit 2653

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-90* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *10,11,13-19,22,23,29,32,33,40-46,49-51 and 57-60* is/are allowed.

6)☒ Claim(s) *1-9,12,20,21,24-28,30,31,34-39,47,48,52-56 and 61-90* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *10* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

> *A person shall be entitled to a patent unless --*
> *(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.*

2. Claims 52-55 are rejected under 35 U.S.C. § 102(b) as being anticipated by Koyanagi et al. (U.S. Patent 5,471,064).

Koyanagi teaches a method of making a media for storing data in the form of anomalies on a surface of the media having all of the steps as recited in claims 52-55. For example, Koyanagi teaches the following:

(a) as in claim 52, texturing the surface of the media 4 (Figs. 5a-c show texturing steps);

(b) as in claim 53, coating the media surface with a material; and removing the material coating (Figs. 5a-c show a coating material 26 and removing material 27);

(c) as in claim 54, the texturing produces a lumpy pattern 26, 27 on the media surface (Figs. 5a-c); and

(d) as in claim 55, the texture formed in a random pattern on the media surface at approximately 30-50 nanometers spacing (Figs. 5a-c; 30-50 nanometer spacing is the typical range of a STM/AFM).

3. Claims 61-76, 79, 80, 83-87, 89 and 90 are rejected under 35 U.S.C. § 102(b) as being anticipated by Koyanagi et al. (U.S. Patent 5,471,064).

Koyanagi teaches a memory apparatus having all of the elements and means as recited in claims 61-76, 79, 80, 83-87, 89 and 90. For example, Koyanagi teaches the following:

(a) as in claim 61, moveable media 4 having a surface for placing anomalies (Figs. 5a-5c);

(b) as in claim 61, a moveable reading/writing mechanism 2 including a moveable platform comprising aluminum (Fig. 1; column 3, lines 56-64);

(c) as in claim 61, at least one fine tip portion 1 attached to the moveable platform 2 such that each of the at least one fine tip portion is adapted to be independently actuated toward the moveable storage medium 4 (Fig. 1);

(d) as in claim 61, a media movement mechanism 10 attached to the moveable media and configured to move the media in response to media control signals (Fig. 1);

(e) as in claim 61, a platform movement mechanism 5 attached to the platform and adapted to move the platform in response to platform control signals (Fig. 3);

(f) as in claim 61, the at least one fine tip portion comprises a device configured to cause the formation of an

anomaly on the surface and read an anomaly on the surface (Figs. 5a-5c);

(g) as in claim 62, the anomaly is selected from a group comprised of molecular aberrations and atomic aberrations (Figs 7a and 7b);

(h) as in claim 63, the anomaly is selected from a group comprised of molecular orientation, atomic orientation, electron orientation, and magnetic field orientation (Figs. 7a and 7b);

(i) as in claim 64, the anomaly is a surface charge (Figs. 7a and 7b);

(j) as in claim 65, the anomaly is selected from a group comprised of molecular voids, atomic voids, electronic voids, and magnetic field voids (Figs 5a-5c);

(k) as in claim 66, the anomaly is a molecular bond state (Figs. 7a and 7b);

(l) as in claim 67, the anomaly is a crystalline lattice structure (Figs 5a-5c, anomaly is formed by SiO_2);

(m) as in claim 68, an i/o device 11 having an addressing port for identifying an address corresponding to an area of the storage medium where anomaly is to be one of written and read (Fig. 3; XY driving device 10 includes address corresponding to an area of the anomaly);

(n) as in claim 68, an i/o port 11 for transferring one of anomaly to be read from the storage medium 4 (Fig. 3);

(o) as in claim 68, anomaly to be written to the storage medium via the at least one fine tip portions (Fig. 4);

(p) as in claim 68, an addressing control device 10 configured to send control signals to each of the medium and platform movement mechanisms so that the at least one fine tip portion 1 passes an area on the storage medium 4 corresponding to an address identified at the addressing port (Fig. 3);

(q) as in claim 69, the writing fine tip portion 1 comprises an electromagnetic radiation energy source (Fig. 3; voltage device 12 applies voltage to the tip);

(r) as in claim 70, the reading fine tip portion 1 comprises an electromagnetic radiation sensitive receptor 19 (Fig. 3; column 5, lines 60-64);

(s) as in claim 71, the fine tip portion 1 applies a repositioning force comprising at least one of a mechanical force, chemical force, electrostatic force, electromagnetic radiation and magnetic field to create the anomaly (Figs. 7a and 7b);

(t) as in claim 72, the fine tip portion 1 utilizes the repositioning force to remove and/or reposition at least one of atoms, molecules, electrons, and magnetic domains to or

from at least one of above, on and below a surface of the storage medium to create the anomaly (Figs, 7a and 7b);

(u) as in claim 73, the fine tip portion 1 is adapted to detect a difference in at least one of current, voltage, electromagnetic radiation, and vibration of the anomaly (Fig. 3; column 5, lines 60-64);

(v) as in claim 74, an analysis device configured to analyze patterns of changing amplitude of the fine tip portion (Figs. 7a and 7b; column 5, lines 1-15);

(w) as in claim 75, at least one of the medium movement mechanism and the platform movement mechanism comprises an electrostatic device constructed to move at least one of the storage medium and the platform based on an applied electrostatic potential; and a electrostatic control and supply device connected to the addressing control device and configured to apply an electrostatic potential to the electrostatic device to move at least one of the storage medium and the platform to pass the area on the storage medium according to the control signals sent by the addressing control device (Fig. 4; electrostatic controller is an inherent feature for driving the tip and media 4);

(x) as in claim 76, a calibration mechanism 9 configured to move the storage medium and the platform to a full extent of a range of motions and determine amounts of electrostatic force

needed to move the storage medium to multiple positions in relation to the platform (Fig. 1);

(y) as in claim 79, the storage medium is constructed from a substrate having a texture coating applied and removed, leaving surface texture on the media (Figs. 5a-5c);

(z) as in claim 80, the storage medium comprises a substrate having a surface with texture marks (Figs. 5a-5c);

(aa) as in claim 83, at least one positioning mechanism 5 attached to the platform and at least one of the fine tip portions, the positioning mechanism configured to position the fine tip portion at one of at, above, and below a surface of the storage medium while reading, and position the fine tip at one of at above, and below the surface while writing (Fig. 4);

(bb) as in claim 84, each fine tip portion comprises a cantilever 2 attached to each fine tip portion 1; and an activation/pickup device 12 connected to each cantilever 2 (Fig. 1);

(cc) as in claim 85, that a source 200 configured to produce electromagnetic radiation emanations; and a focusing device 17 adapted to direct the emanations to a predetermined location on the storage medium (Fig. 2);

(dd) as in claim 86, a receptor 201 configured to receive a return of the emanation from the media surface (Fig. 2);

(ee) as in claim 87, the source 200 comprises one of a light emitting diode; and the focusing device 17 comprises a waveguide 13 configured to direct a narrow beam from the fine tip (Fig. 2);

(ff) as in claim 89, a z-axis mechanism connected to at least one of the fine tip portions and the platform; wherein the z-axis mechanism 5 is configured to place the at least one of the fine tip portions at least one of on and near the storage medium (Fig. 3); and

(gg) as in claim 90, each fine tip portion comprises a cantilever 2 having a chamfered tip 1; and a z-axis drive mechanism 5 attached to the platform and connected to the cantilever 2; wherein the z-axis drive mechanism 5 is configured to place the cantilever 2 at least one of on and a close proximity to the storage medium (Figs. 1 and 3).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> *(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.*

5. Claims 1-9, 12, 24, 25, 30, 31, 34-36, 38, 39, 47 and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koyanagi et al. (U.S. Patent 5,471,064) in view of Suzuki et al. (U.S. Patent 5,929,438).

Koyanagi teaches a memory apparatus very similar to that of the present invention. For example, Koyanagi teaches the following:

(a) as in claim 1, a moveable media 4 having a surface 4 for placing anomalies thereon (Figs. 4, 5a, 5b and 5c);

(b) as in claim 1, a moveable reading/writing mechanism 5 comprising a moveable platform (Fig. 4);

(c) as in claim 1, at least one fine tip portion 25 attached to the moveable platform 5 configured to write anomalies and read anomalies on the media surface (Figs. 4, 5a, 5b and 5c);

(d) as in claim 1, a media movement mechanism 401 attached to the moveable media 4 and configured to move the media in response to media control signals (Fig. 4);

(e) as in claim 1, a platform movement mechanism attached to the platform 5 and configured to move the platform in response to platform control signals (Fig. 4);

(f) as in claim 1, the at least one fine tip portion 25 comprises a device configured to cause the formation of an anomaly on the surface and read an anomaly on the surface (Figs. 4, 5a, 5b and 5c);

(g) as in claim 2, an i/o device 10a having an addressing port for identifying an address corresponding to an area of the media surface where data is to be one of written and read (Fig. 4; XYZ drive controller 10a identifies an address to be written);

(h) as in claim 2, an i/o port 11, 12 for transferring one of data to be read from and written to the media surface via the at least one fine tip portion (Fig. 4);

(i) as in claim 2, an addressing control device 10a configured to send control signals to each of the media and platform movement mechanisms so that the at least one fine tip portion passes an area on the media surface corresponding to an address identified at the addressing port (Fig. 4; XYZ are the control signals);

(j) as in claim 3, the writing fine tip portion 25 comprises an electromagnetic radiation energy source (Fig. 4; write mode);

(k) as in claim 4, the reading fine tip portion 25 comprises an electromagnetic radiation sensitive receptor (Fig. 4; read mode);

(l) as in claim 5, the writing fine tip portion 25 applies a repositioning force comprising at least one of a mechanical force, chemical force, electrostatic force, electromagnetic radiation, and magnetic field to cause the anomalies (Fig. 4);

(m) as in claim 6, the writing fine tip portion 25 utilizes the repositioning force to at least one of remove and reposition of at least one of atoms, molecules, electrons, and magnetic domains at least one of above, on and below the media surface to cause the anomalies (Fig. 4, 5a, 5b and 5c);

(n) as in claim 7, the reading fine tip 25 is configured to detect at least one of current, voltage electromagnetic radiation, vibration parameters [phase and amplitude] having been one of caused or affected by the anomalies (Figs. 7a and 7b);

(o) as in claim 8, an analysis device 8 configured to analyze at least one of, patterns of current between the reading fine tip and the media surface, patterns of

electromagnetic radiation received from the media surface in response to a stimulus patterns of shifting phase of vibrations of the reading fine tip; patterns of changing amplitude of the reading fine tip; and patterns of at least one of current and voltage between the reading fine tip and the media surface (Fig. 4);

(p) as in claim 9, least one of the media movement mechanism 401 and the platform movement mechanism 5 comprises an electrostatic device constructed to move at least one of the media and the platform based on an applied electrostatic potential (Fig. 4);

(q) as in claim 9, an electrostatic control and supply device 12 connected to the addressing control device and configured to apply an electrostatic potential to the electrostatic device to move at least one of the media and the platform to pass the area on the media surface according to the control signals sent by the addressing control device (Fig. 4; electrostatic controller is an inherent feature for driving the tip 25 and media 4);

(r) as in claim 12, a calibration mechanism 9 configured to move the media 4 and the platform 5 to a full extent of a range of motions and determined amounts of electrostatic force needed to move the media 4 to plural positions in relation to the platform (Fig. 1);

(s) as in claims 24 and 25, the media is constructed from a substrate having surface texture on the media (Fig. 5a-c);

(t) as in claim 30, at least one positioning mechanism 5 attached to the platform and at least one of the fine tip portions, the positioning mechanism configured to position the fine tip portion at one of at, above, and below the media surface while reading, and position the fine tip at one of at, above, and below the media surface while writing (Fig. 4);

(u) as in claim 31, a cantilever 3 attached to each fine tip portion 1; and an activation/pickup device connected to each cantilever (Fig. 2; column 5, lines 22-36);

(v) as in claim 34, a source 200 configured to produce electromagnetic radiation emanations; and a focusing device 17 configured to direct the emanations to a predetermined location on the media surface (Fig. 2);

(w) as in claim 35, a receptor 201 configured to receive a return of the emanation from the media surface (Fig. 2);

(x) as in claim 36, the source 200 comprises one of a light emitting diode; and the focusing device 17 comprises a waveguide 13 configured to direct a narrow beam from the fine tip (Fig. 2);

(y) as in claim 38, a z-axis mechanism 5 connected to at least one of the fine tip portions 1 and the platform, wherein the z-axis mechanism is configured to place the at least one of

the fine tip portions at least one of on and near the media surface (Figs. 1 and 4); and

(z) as in claim 39, each fine tip portion 1 comprises a cantilever 3 having a chamfered tip; and a z-axis drive mechanism 5 attached to the platform 5 and connected to the cantilever; wherein the z-axis drive mechanism is configured to place the cantilever at least one of on and a close proximity to the media surface (Figs 1 and 4).

However, Koyanagi does not teach the following:

(a) as in claim 1, the moveable platform comprising silicon dioxide; and

(b) as in claim 1, each of the at least one fine tip portion is adapted to be independently actuated toward the media surface.

Suzuki teaches the following:

(a) a moveable platform 601 comprising silicon dioxide 603 (Fig. 46); and

(b) each of the at least one fine tip portion 604 is adapted to be independently actuated toward the media surface (Fig. 47).

To reduce the wear of a fine tip such as Koyannagi's, it would have been obvious to one of ordinary skill in the art at the time of invention to manufacture a fine tip from a silicon dioxide film such as Suzuki's, because the etching of the

silicon dioxide creates a protective cover on the fine tip such as Koyanagi's.

On the other hand, there is an advantage of accessing multiple anomalies at the same time. It would have been obvious to one of ordinary skill in the art at the time of invention to fabricate a fine tip which is independently actuated such as Suzuki's, because the multiple actuating tips can read/write anomalies simultaneously.

6. Method claims 47 and 48 are drawn to the method of using the corresponding apparatus claimed in claims 1 and 34-36. Therefore method claims 47 and 48 correspond to apparatus claims 1 and 34-36 are rejected for the same reasons of anticipation (obviousness) as used above.

7. Claims 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koyanagi et al. (U.S. Patent 5,471,064) in view of Suzuki et al. (U.S. Patent 5,929,438) and Adderton et al. (U.S. Patent 6,196,061).

Koyanagi teaches a memory apparatus very similar to that of the present invention. For example, Koyanagi teaches the following:

(a) as in claim 1, a moveable media 4 having a surface 4 for placing anomalies thereon (Figs. 4, 5a, 5b and 5c);

(b) as in claim 1, a moveable reading/writing mechanism 5 comprising a moveable platform (Fig. 4);

(c) as in claim 1, at least one fine tip portion 25 attached to the moveable platform 5 configured to write anomalies and read anomalies on the media surface (Figs. 4, 5a, 5b and 5c);

(d) as in claim 1, a media movement mechanism 401 attached to the moveable media 4 and configured to move the media in response to media control signals (Fig. 4);

(e) as in claim 1, a platform movement mechanism attached to the platform 5 and configured to move the platform in response to platform control signals (Fig. 4);

(f) as in claim 1, the at least one fine tip portion 25 comprises a device configured to cause the formation of an anomaly on the surface and read an anomaly on the surface (Figs. 4, 5a, 5b and 5c);

(g) as in claim 20, the drive mechanism 5 includes actuators, coupling rod 21, electrical paths and electrical supplies (Fig. 3); and

(h) as in claim 21, a sensor 8 configured to detect an amount of movement of the actuators; wherein the sensor provides feedback to a control device regulating an amount of the electricity supplied.

However, Koyanagi does not teach the following:

(a) as in claim 1, the moveable platform comprising silicon dioxide;

(b) as in claim 1, each of the at least one fine tip portion is adapted to be independently actuated toward the media surface; and

(c) as in claim 20, the media movement mechanism and the platform movement mechanism comprises a thermal drive mechanism.

Suzuki teaches the following:

(a) a moveable platform 601 comprising silicon dioxide 603 (Fig. 46); and

(b) each of the at least one fine tip portion 604 is adapted to be independently actuated toward the media surface (Fig. 47).

Adderton teaches the following:

(a) the platform movement mechanism comprises a thermal drive mechanism 154 (Fig. 2; column 13, lines 10 and 11).

To fabricate a fine tip such as Koyannagi's, it would have been obvious to one of ordinary skill in the art at the time of

invention to form a silicon dioxide film such as Suzuki's, because the etching of the silicon dioxide creates a fine tip such as Koyanagi's.

On the other hand, there is an advantage of accessing multiple anomalies at the same time. It would have been obvious to one of ordinary skill in the art at the time of invention to fabricate at least one Koyanagi's fine tip which is independently actuated such as Suzuki's, because the multiple actuating tips can read/write anomalies simultaneously.

Furthermore, a scanning probe is generally driven by a piezo-electric actuator. However, a thermal actuator has a higher image quality because of its longer actuating range. When there is an advantage of extending a scanning probe closer to a scanned object such as Koyanagi's recorded data, it would have been obvious to one of ordinary skill in the art at the time of invention to replace Koyanagi's piezo-electric probe actuator with Adderton's thermal actuator, because the thermal actuator can drive the probe closer to the recording surface which results in lower noise and higher reliability in accessing data.

8. Claims 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koyanagi et al. (U.S. Patent 5,471,064) in view of Suzuki et al. (U.S. Patent 5,929,438) and Mamin et al. (U.S. Patent 5,804,710).

Koyanagi teaches a memory apparatus very similar to that of the present invention. However, Koyanagi does not teach the following:

(a) as in claim 1, the moveable platform comprising silicon dioxide;

(b) as in claim 1, each of the at least one fine tip portion is adapted to be independently actuated toward the media surface;

(c) as in claim 26, the media comprises a substrate having a surface with track and sector marks; and

(d) as in claim 27, an alignment device configured to move the media and the platform such that the at least one fine tip portion moves across the track and sector marks and calibrate the media movement mechanisms based on detection of the track and sector marks by the at least one fine tip portion.

Suzuki teaches the following:

(a) a moveable platform 601 comprising silicon dioxide 603 (Fig. 46); and

(b) each of the at least one fine tip portion 604 is

adapted to be independently actuated toward the media surface (Fig. 47).

Mamin teaches a memory device having tracks, sector marks and alignment device as in above (a) to (c) (Figs. 1 and 8; column 10, lines 2-7).

To fabricate a fine tip such as Koyannagi's, it would have been obvious to one of ordinary skill in the art at the time of invention to form a silicon dioxide film such as Suzuki's, because the etching of the silicon dioxide creates a fine tip such as Koyanagi's.

On the other hand, there is an advantage of accessing multiple anomalies at the same time. It would have been obvious to one of ordinary skill in the art at the time of invention to fabricate at least one Koyanagi's fine tip which is independently actuated such as Suzuki's, because the multiple actuating tips can read/write anomalies simultaneously.

Furthermore, although Koyanagi does not teach that his recording medium has tracking means such as tracks and sector marks, however, tracking a recording medium is a required scanning mechanism because it aligns a scanning head in a proper position with respect to the recording medium. For example, Mamin teaches tracks and sector marks which can be accessed by a scanning probe. Hence, it would have been

obvious to one of ordinary skill in the art at the time of invention to align a scanning fine tip such as Koyanagi with tracks and sector marks such as Mamin's, because the tracks and sector marks deflect Koyanagyi's scanning tip which then generates servo signals to calibrate the XYZ driving devices.

9. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koyanagi et al. (U.S. Patent 5,471,064) in view of Suzuki et al. (U.S. Patent 5,929,438) and Miyazaki et al. (U.S. Patent 5,412,597).

Koyanagi teaches a memory apparatus very similar to that of the present invention. However, Koyanagi does not teach the following:

(a) as in claim 1, the moveable platform comprising silicon dioxide;

(b) as in claim 1, each of the at least one fine tip portion is adapted to be independently actuated toward the media surface;

(c) as in claim 28, at least one fine tip portion comprises an arm having a chamfered tip coated in a ferromagnetic material; and

(d) as in claim 28, the fine tip portion is configured to detect at least one of magnetic domains and magnetic domain voids on the media surface.

Suzuki teaches the following:

(a) a moveable platform 601 comprising silicon dioxide 603 (Fig. 46); and

(b) each of the at least one fine tip portion 604 is adapted to be independently actuated toward the media surface (Fig. 47).

Miyazaki teaches a scan type magnetic force microscope having a ferromagnetic tip to detect magnetic domains and voids on a media surface (column 13, lines 58-68).

To fabricate a fine tip such as Koyannagi's, it would have been obvious to one of ordinary skill in the art at the time of invention to form a silicon dioxide film such as Suzuki's, because the etching of the silicon dioxide creates a fine tip such as Koyanagi's.

On the other hand, there is an advantage of accessing multiple anomalies at the same time. It would have been obvious to one of ordinary skill in the art at the time of invention to fabricate at least one Koyanagi's fine tip which is independently actuated such as Suzuki's, because the multiple actuating tips can read/write anomalies simultaneously.

A scanning tunnel probe such as Applicant's can be operated in an AFM mode such as Koyanagi's or a MFM mode such as Miyazaki's. In other words, instead of detecting atomic

force on a media surface with Koyanagi's AFM tip, magnetic orientation on the media surface can be detected as well. As an alternative of forming Applicant's read/write device, it would have been obvious to one of ordinary skill in the art at the time of invention to replace Koyanagi's AFM tip with Miayzaki's MFM tip, because the MFM tip can detect local magnetic force of anomalies formed on the media surface.

10. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koyanagi et al. (U.S. Patent 5,471,064) in view of Suzuki et al. (U.S. Patent 5,929,438) and Tanaka (U.S. Patent 5,808,973).

Koyanagi teaches a memory apparatus very similar to that of the present invention. However, Koyanagi does not teach the following:

(a) as in claim 1, the moveable platform comprising silicon dioxide;

(b) as in claim 1, each of the at least one fine tip portion is adapted to be independently actuated toward the media surface; and

(a) as in claim 37, the receptor comprises a polarizing film and a photodiode.

Suzuki teaches the following:

(a) a moveable platform 601 comprising silicon dioxide

603 (Fig. 46); and

(b) each of the at least one fine tip portion 604 is adapted to be independently actuated toward the media surface (Fig. 47).

Tanaka teaches a photodetector 37 with a polarizer 38 (Fig. 2).

To fabricate a fine tip such as Koyannagi's, it would have been obvious to one of ordinary skill in the art at the time of invention to form a silicon dioxide film such as Suzuki's, because the etching of the silicon dioxide creates a fine tip such as Koyanagi's.

When Applicant's scanning device is used as a magnetic recording/reproducing apparatus such as Tanaka's, the reflected electromagnetic wave is polarized. It is required to remove the polarization in order to reproduce the original orientation of the wave. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to replace Koyanagi's laser irradiating head and photodetector 201 with Tanaka's head member 2, because the head member of Tanaka's photodetector has a polarizer means which can eliminate unwanted polarized electromagnetic waves reflected from the media.

11. Claims 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koyanagi et al. (U.S. Patent 5,471,064) in view of Yang et al. (U.S. Patent 6,001,519).

Koyanagi teaches a method of making a media for storing data in the form of anomalies on a surface of the media very similar to that of the prevent invention. However, Koyanagi does not teaches the following:

(a) as in claim 56, the material is a PMMA material.

Yang teaches a high molecular weight information recording medium having a PMMA layer 3 (Fig. 2A).

A typical recording medium has recorded marks that are not stable under an electron density storage device such as Koyanagi's. To improve the reliability of the recording medium, it would have been obvious to one of ordinary skill in the art at the time of invention to use a PMMA type recording medium such as Yang's, because under room temperature, the data formed in the PMMA layer can be maintained intact for a long time.

12. Claims 77 and 78 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koyanagi et al. (U.S. Patent 5,471,064) in view Adderton et al. (U.S. Patent 6,196,061).

Koyanagi teaches a memory apparatus very similar to that of the present invention. For example, Koyanagi teaches the following:

(a) as in claim 77, the drive mechanism 5 includes actuators, coupling rod 21, electrical paths and electrical supplies (Fig. 3); and

(b) as in claim 78, a sensor 8 configured to detect an amount of movement of the actuators; wherein the sensor provides feedback to a control device regulating an amount of the electricity supplied.

However, Koyanagi does not teach the following:

(a) as in claim 77, the media movement mechanism and the platform movement mechanism comprises a thermal drive mechanism.

Adderton teaches the following:

(a) the platform movement mechanism comprises a thermal drive mechanism 154 (Fig. 2; column 13, lines 10 and 11).

A scanning probe is generally driven by a piezo-electric actuator. However, a thermal actuator has a higher image quality because of its longer actuating range. When there is an advantage of extending a scanning probe closer to a scanned

object such as Koyanagi's recorded data, it would have been obvious to one of ordinary skill in the art at the time of invention to replace Koyanagi's piezo-electric probe actuator with Adderton's thermal actuator, because the thermal actuator can drive the probe closer to the recording surface which results in lower noise and higher reliability in accessing data.

13. Claim 81 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koyanagi et al. (U.S. Patent 5,471,064) in view of Mamin et al. (U.S. Patent 5,804,710).

Koyanagi teaches a memory apparatus very similar to that of the present invention. However, Koyanagi does not teach the following:

(a) as in claim 81, the substrate having a surface with track and sector marks.

Mamin teaches a memory device having tracks and sector marks (Figs. 1 and 8; column 10, lines 2-7).

Koyanagi does not teach that his recording medium has tracking means such as tracks and sector marks, however, tracking a recording medium is a required scanning mechanism because it aligns a scanning head in a proper position with respect to the recording medium. For example, Mamin teaches tracks and sector marks which can be accessed by a scanning

probe. Hence, it would have been obvious to one of ordinary skill in the art at the time of invention to align a scanning fine tip such as Koyanagi with tracks and sector marks such as Mamin's, because the tracks and sector marks deflect Koyanagi's scanning tip which then generates servo signals to calibrate the XYZ driving devices.

14. Claim 82 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koyanagi et al. (U.S. Patent 5,471,064) in view of Miyazaki et al. (U.S. Patent 5,412,597).

Koyanagi teaches a memory apparatus very similar to that of the present invention. However, Koyanagi does not teach the following:

(a) as in claim 82, the fine tip portion is configured to detect at least one of magnetic domains and magnetic domain voids on the media surface.

Miyazaki teaches a scan type magnetic force microscope having a ferromagnetic tip to detect magnetic domains and voids on a media surface (column 13, lines 58-68).

A scanning tunnel probe such as Applicant's can be operated in an AFM mode such as Koyanagi's or a MFM mode such as Miyazaki's. In other words, instead of detecting atomic force on a media surface with Koyanagi's AFM tip, magnetic orientation on the media surface can be detected as well. As

an alternative of forming Applicant's read/write device, it would have been obvious to one of ordinary skill in the art at the time of invention to replace Koyanagi's AFM tip with Miayzaki's MFM tip, because the MFM tip can detect local magnetic force of an anomalies formed on the media surface.

15. Claim 88 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koyanagi et al. (U.S. Patent 5,471,064) in view of Tanaka (U.S. Patent 5,808,973).

Koyanagi teaches a memory apparatus very similar to that of the present invention. However, Koyanagi does not teach the following:

(a) as in claim 88, the receptor comprises a polarizing film and a photodiode.

(c)

Tanaka teaches a photodetector 37 with a polarizer 38 (Fig. 2).

When Applicant's scanning device is used as a magnetic recording/reproducing apparatus such as Tanaka's, the reflected electromagnetic wave is polarized. It is required to remove the polarization in order to reproduce the original orientation of the wave. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to replace Koyanagi's laser irradiating head and photodetector 201 with

Tanaka's head member 2, because the head member of Tanaka's photodetector has a polarizer means which can eliminate unwanted polarized electromagnetic waves reflected from the media.

Allowable Subject Matter

16. Claims 10, 11, 13-19, 22, 23, 29, 32, 33, 40-46, 49-51 and 57-60 are allowable over prior art.

17. The following is an Examiner's statement of reasons for the indication of allowable subject matter:

As in claim 10, the prior art of record fails to teach or fairly suggest that the electrostatic device comprises a series of prong sets, wherein, the prong sets are attached in series such that a first of the prong sets is attached at a first end to a fixed position of the apparatus, and a second end of the first prong set is attached to a first end of a second of the prong sets, and so on, until a last of the prong sets is attached at a first end to a second end of an n-1 prong set, and a second end of the last (n) prong set is attached to one of the media and the platform.

As in claim 22, the prior art of record fails to teach or fairly suggest that wherein the capacitance sensor comprises

a fixed comb having fingers protruding in an x-axis direction, a moving comb connected to the coupling having fingers protruding in an x-axis direction and interleaved among the fingers of the fixed comb.

As in claim 23, the prior art of record fails to teach or fairly suggest that a capacitive comb array comprises a fixed comb and a moving comb each having a set of fingers interleaved between the other set of fingers.

As in claim 29, the prior art of record fails to teaches or fairly suggest that a re-planing device configured to remove at least 4 part of each anomaly on the media surface.

As in claim 32, the prior art of record fails to teach or fairly suggest that the activation/pickup device is at least one of electrostatically and capacitively activated causing the cantilever to vibrate near a resonance frequency of the cantilever; and the activation/pickup mechanism is configured to detect a phase change of vibrations of the cantilever caused by the fine tip interacting with the media surface via at least one of electrical, magnetic, and physical forces.

As in claim 33, the prior art of record fails to teach or fairly suggest that a cleaning device configured to remove unwanted 4 particles from the fine tip.

As in claims 40 and 41, the prior art of record fails to teach or fairly suggest that the z-axis drive mechanism

comprises a cantilever connected to the fine tip portion at one end, and at least one set of comb fingers rotatably attached to the platform allowing movement of the cantilever and the fine tip portion in at least a z-axis direction.

As in claim 43, the prior art of record fails to teach or fairly suggest that the z-axis drive mechanism comprises a lever connected to the fine tip portion at one end; a torsion bar connected at a second end of the lever; an isolation bridge connected at one of the second end of the lever and the torsion bar; a second torsion bar connected to the isolation bridge.

As in claim 45, the prior art of record fails to teach or fairly suggest that the z-axis drive mechanism comprises a lever connected to the fine tip portion at one end; a thermal bimorph, comprising a heater, and at least two materials of different expansion coefficients; wherein a current applied to the heater raises the temperature of the bimorph, causing the bimorph to expand or contract and move the lever and the fine tip portion in a z-axis direction.

As in claim 49, the prior art of record fails to teach or fairly suggest that a cantilever having the fine tip attached at a first end; a moving assembly attached to the cantilever, comprising, a torsion bar electrically isolated and attached to the cantilever, and a force receiver attached to the cantilever and configured to apply force to the cantilever.

As in claim 57, the prior art of record fails to teach or fairly suggest that nubs are placed between the media and the platform for providing a bearing for movement of the platform relative to the media.

As in claim 58, the prior art of record fails to teaches or fairly suggest that the media comprises an amplifying media having electrodes at ends of the media, and a control area activated by the tips.

As in claim 59, the prior art of record fails to teach or fairly suggest that the media comprises a material having energy wells with increased capacitance for storing data on the media.

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

***A** shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.*

19. Any response to this action should be mailed to:

Commissioner of Patents and Trademarks Washington, D.C. 20231 Or faxed to:

(703) 872-9314 (for formal communications intended for entry. Or:

(703) 746-6909, (for informal or draft communications, please label "PROPOSED" or "DRAFT")

Hand-delivered responses should be brought to Crystal Park II, 2021 Crystal Drive, Arlington. VA., Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-4700.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kim CHU whose telephone number is (703) 305-3032 between 9:30 am to 6:00 pm, Monday to Friday.

KC 5/16/03

Kim-Kwok CHU
Examiner AU2653
May 16, 2003

(703) 305-3032

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